

# Interview Summary

Application No.

10/536,853

Applicant(s)

AZNAR, PASCAL

Examiner

BRITTANY M. MARTINEZ

Art Unit

1793

All participants (applicant, applicant's representative, PTO personnel):

(1) BRITTANY M. MARTINEZ.

(3) Mr. Pehr Jansson.

(5) Mr. Domingo Sanchez

(2) Wayne Lange!

(4) Mr. Pascal Aznar.

Date of Interview: 08 March 2010.

Type: a) ☐ Telephonic b) ☐ Video Conference  
c) ☒ Personal [copy given to: 1) ☒ applicant 2) ☐ applicant's representative]

Exhibit shown or demonstration conducted: d) ☒ Yes e) ☐ No.

If Yes, brief description: Flash chromatography columns

Claim(s) discussed: 1 & 2.

Identification of prior art discussed: Prior art of record.

Agreement with respect to the claims f) ☐ was reached. g) ☐ was not reached. h) ☐ N/A.

Substance of Interview including description of the general nature of what was agreed to if an agreement was reached, or any other comments: Participants gave a presentation as summarized in the attached slides. The participants also presented technical literature regarding the invention.  
(A fuller description, if necessary, and a copy of the amendments which the examiner agreed would render the claims allowable, if available, must be attached. Also, where no copy of the amendments that would render the claims allowable is available, a summary thereof must be attached.)

THE FORMAL WRITTEN REPLY TO THE LAST OFFICE ACTION MUST INCLUDE THE SUBSTANCE OF THE INTERVIEW. (See MPEP Section 713.04). If a reply to the last Office action has already been filed, APPLICANT IS GIVEN A NON-EXTENDABLE PERIOD OF THE LONGER OF ONE MONTH OR THIRTY DAYS FROM THIS INTERVIEW DATE, OR THE MAILING DATE OF THIS INTERVIEW SUMMARY FORM, WHICHEVER IS LATER, TO FILE A STATEMENT OF THE SUBSTANCE OF THE INTERVIEW. See Summary of Record of Interview requirements on reverse side or on attached sheet.

Mr. Aznar gave a presentation of the background of the invention. The examiner suggested amending Claim 1 to recite "a flash Chromatography column" (as opposed to a "column for flash chromatography"). The examiners also stated that a rule 1.132 declaration would be required to provide evidence of differences in structure between flash chromatography columns and other chromatography columns such as HPLC columns. The possibility of claiming the invention as a method was also discussed. The participants also provided samples of the inventive chromatography columns.

10/536,853

Examiner Interview on  
Patentability

March 8, 2010

- Mr. Pascal Aznar
- Dr. Domingo Sanchez, Ph. D.,  
Chemistry, Chalmers University,  
Göteborg, Sweden
- Mr. Pehr Jansson, Reg. No. 35,759

# Our Suggested Agenda

- Historical perspective of Chromatography
- Types of Chromatography
- Where Prior Art References Fit in the Types of Chromatography
- Mr. Aznar's Story of the Invention and Resultant Claim
- Relationship of Mr. Aznar's Claim to Prior Art
- Why Mr. Aznar's Claim is non-obvious WRT to the Prior Art

# History of Chromatography I

- Invented C:A 1900 by Mikhail Tswett
- 1900 Gravitation Chromatography
  - Amorphous, cellulose packing, gravity fed at atmospheric pressure.
  - 1950 - Gravitation Chromatography with large irregular rigid silica or large spherical, soft particles.
  - Long separation time, poor purity of separation.

# History of Chromatography II

- 1970 High Perf. Liquid Chromatography (HPLC)
  - Small, irregular (later spherical) silica particles
  - Very high pressure ~450 - 700 bar
  - Columns are pressure vessels with thick steel walls
  - Short separation times
  - High purity
  - Both for analytical and purification; however, very high cost for purification purposes

# History of Chromatography III

- 1978 Flash Column Chromatography
  - Introduced by W.C. Still of Columbia Univ.
  - Improvement WRT to Gravitation Chromatography
  - Solvent driven with a small positive pressure (2 - 8 bars)
  - Irregular particles of 40 - 60  $\mu\text{m}$
  - Separations performed relatively quickly (~20 min)
  - Improved separation WRT to GC
  - Low cost

# History of Chromatography IV

- 2004: Ultra High Performance Chromatography (UPLC)
- Very small particles (1.7  $\mu\text{m}$ )
- 1,000 bar (15,000 psi) - requires special equipment to withstand high pressures
- Great Separation Performance
- Very Expensive
- Used for analytical purposes



# Factors Characterizing Chromatography Technologies

- Driving Pressure
- Purpose
- Packing material
  - Size
  - Shape
- One time or multi-use columns
- Nature of the equipment
- Results
- Separation Time
- Cost

	Gravity	Flash I (BW-300)	Flash II (Fuji L60D)	HPLC	UPLC
Purpose	Purification	Purification	Purification	Analysis/ Purification	Analysis
Pressure	Atmospheric	2 - 8 bars	2 - 8 bars	300 bars	1000 bars
Part. Size	40 - 200 $\mu\text{m}$	42 $\mu\text{m}$	60 $\mu\text{m}$	3 - 10 $\mu\text{m}$	~1.7 $\mu\text{m}$
Part. Shape	Irregular	Irregular	Spherical	Spherical, Irregular	Spherical
Separation Resolution	Very Very Poor	Very Poor	Poor	Very Good	Exceptional
Separation Productivity	Very Very Poor	Very Poor	Poor	Very Good	None (analysis only)
Runs/ Column	1	1	1	Multiuse 400 - 1000	Multiuse 400 - 1000
Price/ Column	\$5 - 20	\$5 - 50	\$5 - 50	\$250 - 1000	\$500 - 1000
Sep. Time	12hrs to days	10 - 30min	10 - 30 min	10min - 1 hr	Few minutes

# Issues

- Whether Mr. Aznar's claims are limited to Flash Chromatography
- The extent to which certain references are applicable to Flash Chromatography

# Examiner's Response to Arguments

- “As written the instant claims do not require the column to be used in flash chromatography.”
- We disagree.
- Preamble states that the claims are directed to “A column for flash chromatography.”

# Corning Glass

- Whether to treat a preamble as a limitation is a determination “Resolved only on review of the entire[ ] . . . patent to gain an understanding of what the inventors actually invented and intended to encompass by the claim.” Corning Glass Works v. Sumitomo Electric U.S.A., Inc., 868 F.2d 1251, 1257, 9 USPQ2d 1962, 1966 (Fed. Cir. 1989);
- The invention here is limited to Flash Chromatography and that is all the inventor intends to encompass by the claim.

# Reliance on preamble in the prosecution

- “clear reliance on the preamble during prosecution to distinguish the claimed invention from the prior art transforms the preamble into a claim limitation because such reliance indicates use of the preamble to define, in part, the claimed invention” *Catalina Marketing v. Cool Savings*
- We have repeatedly relied on Flash Chromatography in the prosecution.

# Jepson Claims indicate intent to use preamble to limit scope

- “For example, this court has held that Jepson claiming generally indicates intent to use the preamble to define the claimed invention, thereby limiting claim scope.” *Catalina Marketing v. Cool Savings*

- Suggested Amendment:

1. A column for flash chromatography wherein the improvement comprises [comprising] spherical and porous silica gel having a particle size between 3 and 45  $\mu\text{m}$  and [pores] pore size between 30 and 300Å.

# What Mr. Aznar has invented

- The use of small spherical silica gel particles in flash chromatography

Claim 1	Claim 2
Flash chromatography Spherical and porous silica gel Particle size 3 - 45 $\mu\text{m}$ Pores of 30 - 300 $\text{\AA}$	Flash chromatography Semi-Spherical and porous silica gel Particle size 3 - 45 $\mu\text{m}$ Pores of 30 - 300 $\text{\AA}$



# How the invention came about

# Aznar Invention WRT Prior Art

	Flash I (BW-300)	Flash II (Fuji FLD60)	Aznar (Flash)	HPLC	UPLC
Purpose	Purification	Purification	Purification	Analysis/ Purification	Analysis
Pressure	2 - 8 bars	2 - 8 bars	2 - 8 bars	300 bars	1000 bars
Part. Size	42 $\mu$ m	60 $\mu$ m	3 - 45 $\mu$ m	3 - 10 $\mu$ m	~1.7 $\mu$ m
Part. Shape	Irregular	Spherical	Spherical / Semi-spher	Spherical, Irregular	Spherical
Separation Resolution	Very Poor	Poor	Good	Very Good	Exceptional
Productivity	Very Poor	Poor	Good	Very Good	None (analysis only)
Runs/ Col	1	1	1	Multiuse 400 - 1000	Multiuse 400 - 1000
Price/ Col	\$5 - 50	\$5 - 50	\$10 - 100	\$250 - 1000	\$500 - 1000
Sep. Time	10 - 30min	10 - 30 min	10 - 30 min	10min - 1 hr	Few minutes

# Results of Aznar v. Previous Flash

Std. Flash

QuickTime™ and a  
decompressor  
are needed to see this picture.

Aznar

RediSep is a product licensed under Mr. Aznar's pat. pend. technology.  
(See also, Declaration of Pascal Aznar in Response of 09-Dec-2008)

# Aznar achieves an unexpected result

- Mr. Aznar sought a better performance within the discipline of Flash Chromatography
- Better performance requires reduction in particle size
- Smaller irregular particles produce higher back pressure; beyond pressures compatible with Flash Chromatography equipment
- That would lead someone to expect that improved performance obtained from smaller particles would require high positive pressure, e.g., like in HPLC

# Mr. Aznar's approach and the unexpected result

- Mr. Aznar obtained the sought performance improvement without excessive back pressure by using smaller but (semi-) spherical particles
- Surprisingly
  - the back pressure was found to be within pressures compatible with Flash Chromatography equipment; and
  - the columns could be manufactured without requiring pressures beyond those tolerated by the flash chromatography equipment

# Prior Art - different technology or different particles

- Williams - HPLC
- Koh - HPLC
- Supelco - SPE
- Schwartz - producing spherical silica (could be for any use)
- Kanda - “pre-focusing”
- Teraoka - EPF and HOPC
- Matsushita - HPLC
- Wanatabe - gravity chromatography
- Danishefsky - Thin Layer Chromatography
- Still - Flash; however, uses Merck Silica which is irregular.



## Resolution with Speed.

RediSep Rf Gold™ silica columns can deliver both high resolving power and speed, giving you the flexibility you need in today's lab. The unique properties of its spherical silica media allow you to run it in different modes we call "Gold Resolution" and "Gold Speed."

- **Gold Resolution:** Use RediSep Rf Gold columns for closely eluting compounds that don't typically separate on standard Flash-grade silica gel columns. The superior media can handle difficult purifications such as trace compounds and isomers, saving you extra steps. The Gold Resolution mode uses the same method settings as a standard column on most Flash chromatography systems — simply replace your column with the better one!
- **Gold Speed:** Use RediSep Rf Gold columns to save your lab time and solvents. By running the column at higher flow rates with a steeper gradient profile, you can shorten run times by an average of 60% to save 30% or more in solvents. These purification runs yield more concentrated fractions to reduce drying time. The Gold Speed mode can also protect some silica-sensitive samples.

Click on the simulations above to see the difference RediSep Rf Gold columns can make. Most chromatography systems can be programmed to duplicate Gold Resolution and Gold Speed modes. However, our *CombiFlash Rf* systems use RFID detection to automatically recall optimized methods preset for each mode and column size.

Ready to try Gold Resolution or Gold Speed purifications for yourself? [Request your free trial kit.](#)

We invite you to learn more about RediSep Rf Gold columns by reading our Application Notes:

- Higher Resolution Results with RediSep Rf Gold Silica Columns, [Application Note 70](#)
- Resolving Minor Compounds with RediSep Rf Gold Columns, [Application Note 71](#)
- Improved Productivity and Savings with RediSep Rf Gold Columns, [Application Note 72](#)

### Other Links:

[RediSep Rf Gold Trial Kit Request](#)

[RediSep Rf Gold Product Web Page](#)

[RediSep Rf Gold Brochure](#)

[RediSep Rf Gold Silica Gel Flyer](#)

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### RediSep Rf Gold™ Run Simulations

Select a simulation...

**Gold Resolution**

$\Delta RI < 0.1$

Take advantage of high resolution to purify closely eluting compounds and isomers.

**Gold Speed**

$\Delta RI > 0.1$

Shorten run times to save purification time and solvents.

#### Notes:

1. Simulation run times are accelerated (1 sec  $\approx$  2 minutes actual run time).
2. "Gold Speed" and "Gold Resolution" are preset methods available on *CombiFlash Rf* flash chromatography systems. Method parameters on non-Isco systems may be modified to produce the same results.

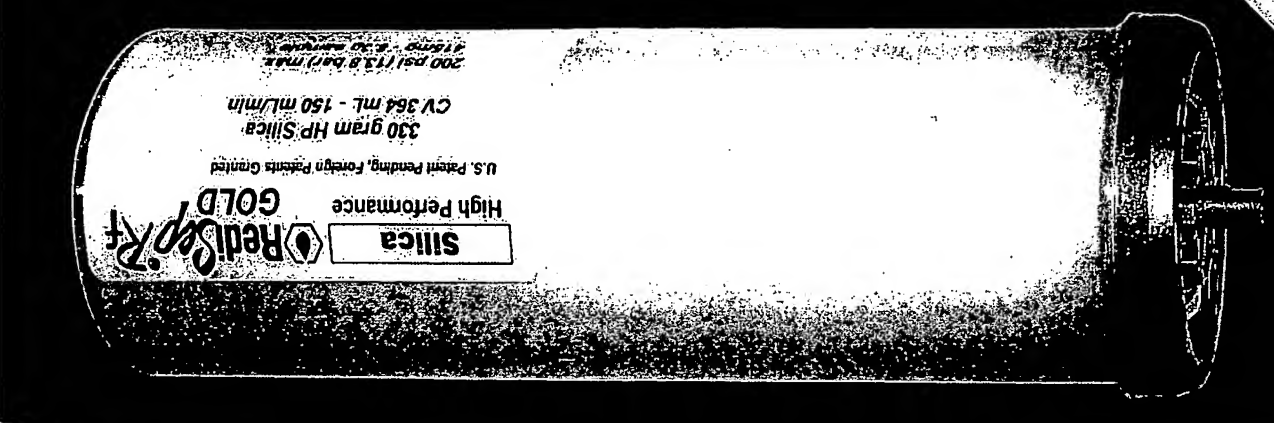


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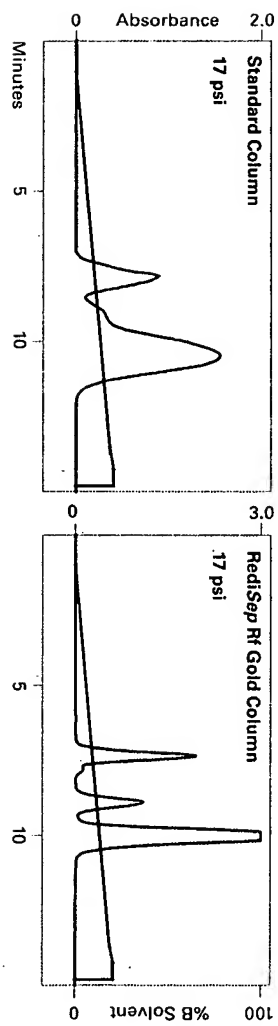
As  
about our  
newest high  
performance column.



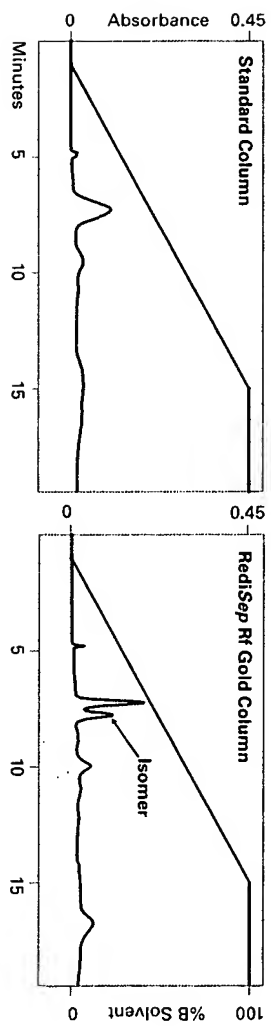
# RediSep Rf Gold™ High Performance Columns

## Spherical Media, 20–40 µm, 60Å

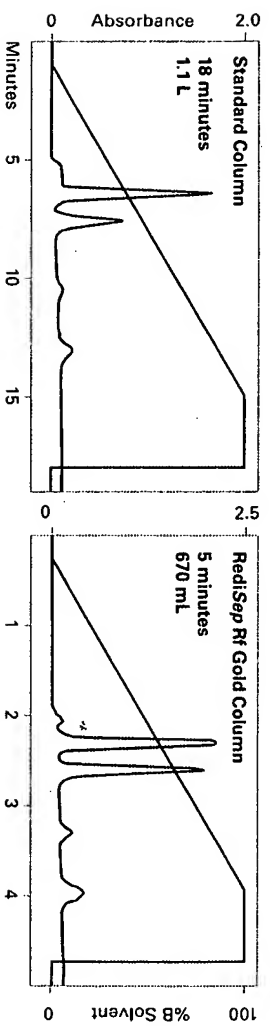
Difficult Separations Made Easy



**Best  
resolution  
No back  
pressure issues**



**Purify isomers**



**60%  
Shorter runs  
30%  
Less solvent**

### Ordering Information

Part Number	Size, Quantity
69-2203-344	4 gram, pkg. of 14.
69-2203-345	12 gram, pkg. of 14.
69-2203-346	24 grams, pkg. of 10.
69-2203-347	40 gram, pkg. of 10.
69-2203-348	80 gram, pkg. of 6.
69-2203-349	120 gram, pkg. of 6.
69-2203-359	220 gram, pkg. of 4.
69-2203-369	330 gram, pkg. of 3.



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L-5149-69-2203-342



The high court defined patent-eligible subject matter "in a flexible and inclusive way that has fostered the tremendous growth of biotechnology for the benefit of millions of patients, farmers, and consumers around the world," says BIO Vice President and General Counsel Thomas DiLenge.

"If the Court of Appeals' contrary approach in the *Bilski* case is permitted to stand, it would create uncertainty that would negatively impact investment in biotechnology and stifle the future growth of this remarkably beneficial industry," DiLenge asserts.

**THE DISPUTE** before the Supreme Court stems from a patent application filed in 1997 by Bernard L. Bilski and his business partner, Rand A. Warsaw. The two inventors claimed to have devised a computerized method for using weather data to predict prices of commodities and energy costs.

But the patent office decided that Bilski's invention did not deserve a patent because it "is not implemented on a specific apparatus and merely manipulates an abstract idea and solves a purely mathematical problem without any limitation to a practical application."

A patentable process, PTO declared, must either transform matter or energy or use a machine to carry out specified steps. Bilski's invention did neither.

Bilski appealed to the Board of Patent Appeals & Interferences, the administrative law body that handles appeals of patent examiner rejections, but was told that because the process did not produce a "useful, concrete, and tangible result," it could not be patented.

The case then proceeded to the U.S. Court of Appeals for the Federal Circuit, which backed the decision of the patent office by a vote of 9-3.

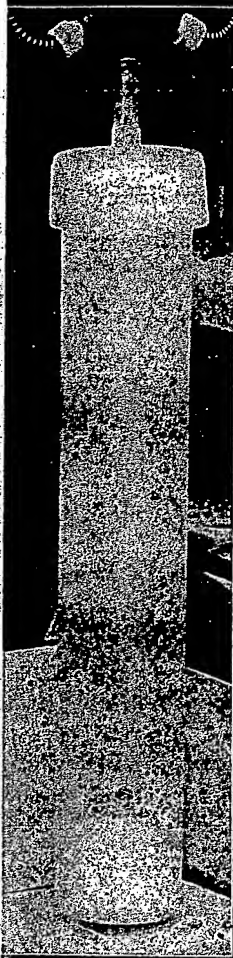
"It is undisputed that [Bilski's] claims are not directed to a machine, manufacture, or composition of matter," said Chief Judge Paul R. Michel, writing for the majority of the appeals court. "Thus, the issue before us involves what the term 'process' in [the law] means, and how to determine whether a given claim ... is a 'new and useful process.'"

"The true issue before us then is whether [Bilski is] seeking to claim a fundamental principle (such as an abstract idea) or a mental process," Michel wrote. "And the underlying legal question thus presented is what test or set of criteria governs the

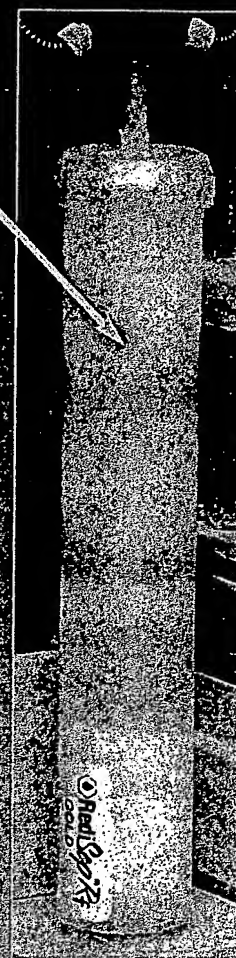
# Proven Purity.

## RediSep Rf Gold™

Standard Flash Column  
(irregular media)



RediSep Rf Gold  
(spherical media)



Tight bands provide maximum resolution allowing greater sample purity or column loading.

Teledyne Isco's RediSep Rf Gold high performance columns purify closely eluting compounds that don't typically separate on standard Flash-grade silica gel columns.

Our patented\*, small spherical flash silica can also handle difficult purifications, such as trace compounds and isomers.

- Ideal for late eluting or high to medium polarity compounds
- Sharper peaks and more concentrated fractions
- Sizes from 4g - 1500g

\* Foreign Patent granted  
U.S. Patent pending

Tight spherical packing provides minimal band broadening.



Request a sample and see the Gold performance for yourself!

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# Resolving Minor Compounds with RediSep Rf Gold™ Columns

Flash chromatography purification using smaller,  
spherical particles



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Chromatography Application Note  
AN71

## Abstract

In drug discovery, it is advantageous to collect compounds synthesized in side reactions from desired compounds. These minor compounds are collected for the purposes of screening and patent protection. Pharmaceutical companies are concerned that similar compounds may show activity in a therapeutic area and should be separated from the desired compound. The minor compounds may show activity similar to the desired material. Collection of minor compounds is also important to demonstrate that these materials do not affect the efficacy or toxicity of the pharmaceutical product. Minor compounds are often difficult to resolve from the main compounds since they are generally an isomer of the main compound.

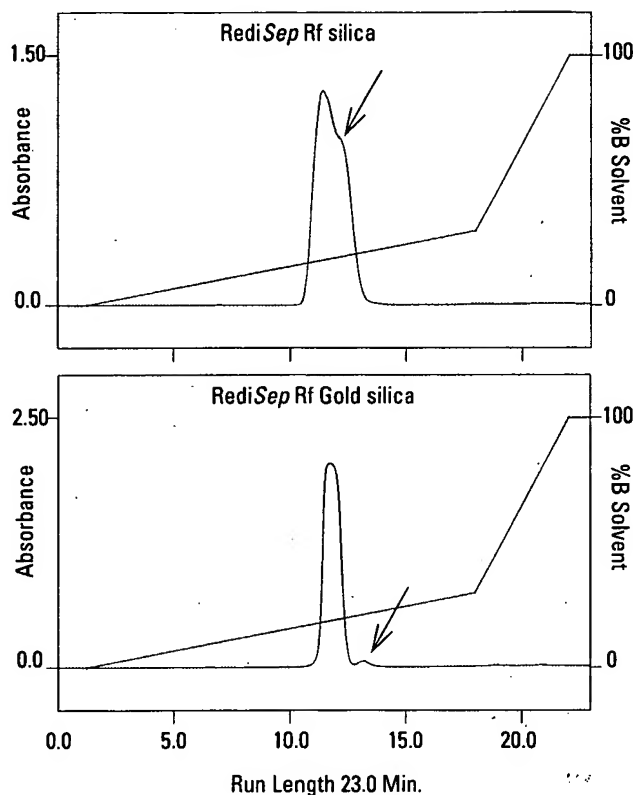
RediSep Rf Gold columns use a smaller particle size that enhances resolution, while minimizing increases in back pressure due to the spherical particle shape. Proprietary end user purifications are used as examples.

## Results and Discussion

Resolution is proportional to the square root of the number of theoretical plates ( $N$ ).  $N \approx 1/d_p$ , where  $d_p$  is the average particle size. The RediSep Rf Gold column derives its improved resolution from smaller particle sizes which increases the number of theoretical plates. This enhanced resolution allows easier collection of minor compounds.

**Table 1: Run Conditions for Example 1**

Column size:	40 g
Load:	500 mg (1.1% loading)
Solvents:	Hexane and Ethyl Acetate
Gradient:	0-100%
Flow rate:	40 mL/min
Run time:	23 min.
Wavelength:	254 nm



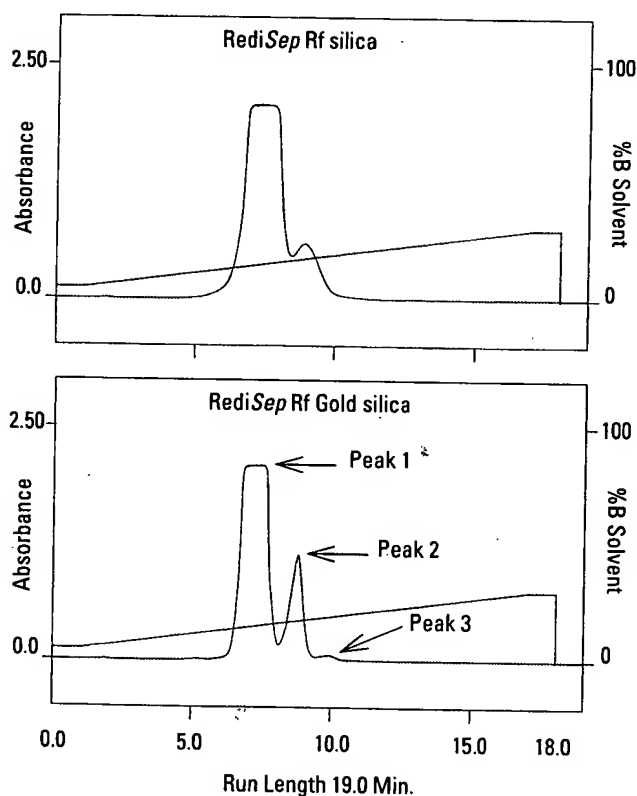
**Figure 1: CombiFlash Rf system chromatogram of a 450 mg separation** using a RediSep Rf silica column (top) and a RediSep Rf Gold silica column (bottom). Arrows denote minor compound.

Near baseline resolution was obtained with the RediSep Rf Gold silica column. The  $\Delta R_f$  between the two compounds was 0.1 on TLC.

The second example is again provided courtesy of the end user. Here, two minor compounds can be purified from the main peak, compared with only one on a conventional Flash column.

**Table 2: Run Conditions for Example 2**

Column size:	40 g
Load:	500 mg (1.1% loading)
Solvents:	Hexane and Ethyl Acetate
Gradient:	20%
Flow rate:	40 mL/min
Run time:	19 min.
Wavelength:	254 nm



**Figure 2: CombiFlash Rf system chromatogram of a minor compound separation** using a RediSep Rf silica column (top) and a RediSep Rf Gold silica column (bottom)

## Conclusion

RediSep Rf Gold columns, packed with a smaller, spherical media provide higher resolution than conventional Flash columns without the higher back pressures. This enhanced resolution can be used to purify minor compounds, which may be screened for activity.

**Table 3: RediSep Rf Gold Columns**

Part Number	Description
69-2203-344	RediSep Rf Gold RediSep Rf Gold Column, 4 g, pkg of 14
69-2203-345	RediSep Rf Gold RediSep Rf Gold Column, 12 g, pkg of 14
69-2203-346	RediSep Rf Gold RediSep Rf Gold Column, 24 g, pkg of 10
69-2203-347	RediSep Rf Gold RediSep Rf Gold Column, 40 g, pkg of 10
69-2203-348	RediSep Rf Gold RediSep Rf Gold Column, 80 g, pkg of 6
69-2203-349	RediSep Rf Gold RediSep Rf Gold Column, 120 g, pkg of 6
69-2203-359	RediSep Rf Gold RediSep Rf Gold Column, 220 g, pkg of 4
69-2203-369	RediSep Rf Gold RediSep Rf Gold Column, 330 g, pkg of 3
69-2203-427	RediSep Rf Gold RediSep Rf Gold Column, 750 g, pkg of 3
69-2203-428	RediSep Rf Gold RediSep Rf Gold Column, 1500 g, pkg of 2

*CombiFlash, RediSep, and Rf are registered trademarks of Teledyne Isco, Inc. All other trademarks are the property of their respective holders.*

*Last modified March 20, 2009*

### Teledyne Isco, Inc.

P.O. Box 82531, Lincoln, Nebraska, 68501 USA

Toll-free: (800) 228-4373 • Phone: (402) 464-0231 • Fax: (402) 465-3091

E-mail: [isconinfo@teledyne.com](mailto:isconinfo@teledyne.com)



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# Improved Productivity and Savings

with RediSep Rf Gold™ Columns



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## Chromatography Application Note AN72

### Abstract

The RediSep Rf Gold™ high performance columns now provide organic chemists with more resolving capability in their flash chromatography purification through the utilization of smaller, spherical media. Finer particle sizes (20–40 µm) easily purify compounds that were previously unresolved with classic flash grade silica (40–60 µm, 60Å).

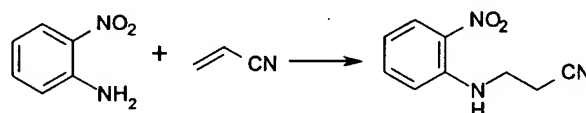
RediSep Rf Gold high performance columns are filled with spherical media that enhance resolution while lower back pressures allow higher flow rates and shorter run times. The properties of the RediSep Rf Gold high performance columns used on the CombiFlash® Rf system will result in an average of 30% or greater laboratory savings of time and solvent.

When used on the CombiFlash Rf system, RFID tags recognize the purification power of the RediSep Rf Gold high performance columns and provide the option of separating with "Gold Resolution" for compounds with a  $\Delta R_f$  of  $\leq 0.1$  or with "Gold Speed" for compounds with a  $\Delta R_f$  of  $> 0.1$  which shorten the run time and increase flow rate. Shorter runs also help purify compounds that are sensitive to silica.

Examples are shown to compare the faster purification times of RediSep Rf Gold high performance columns to standard 40–60 µm silica gel flash columns and also 20–40 µm irregular particle, high performance columns.

### Results and Discussion

Fast purification of 3-(2-nitrophenyl amino) propionitrile

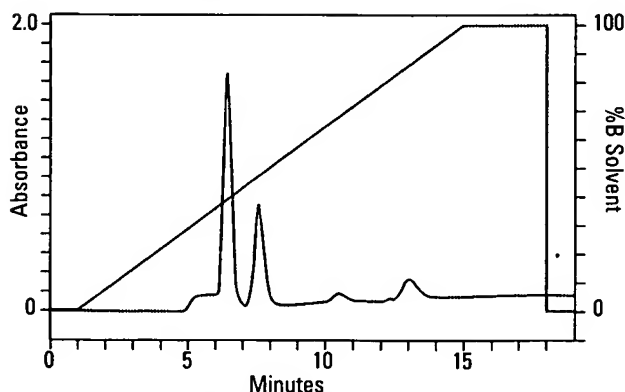


3-(2-nitrophenyl amino) propionitrile was synthesized and the reaction product adsorbed onto celite. This was purified on a CombiFlash Rf using both a standard flash column and RediSep Rf Gold high performance silica gel column. Both columns gave baseline purification of the product but the RediSep Rf Gold column provided improved resolution.

Table 1: Run conditions for Figure 1

Column size:	40 g
Load:	0.4 g (1% load)
Solvents:	Hexane and acetone
Gradient:	0 to 100% acetone
Detection wavelength:	229 nm
Flow rate:	40 mL/min
Run time:	19 min

Standard Flash Column



RediSep Rf Gold Column

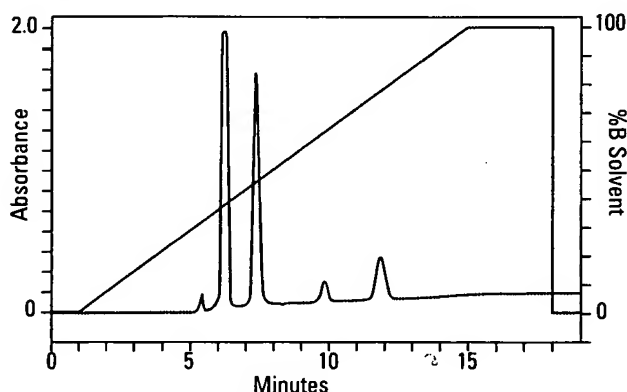


Figure 1: Purification of 3-(2-nitrophenyl amino) propionitrile on a 40 gram standard flash column (left) and a RediSep Rf Gold column (right) using the standard CombiFlash Rf parameters.

This higher, "excess" resolution was employed to reduce the run time of the purification. The run time was shortened by adjusting the gradient slope and increasing the flow rate. The resulting run time of Gold Speed optimized method for RediSep Rf Gold column is only 5 minutes versus 18 minutes with a standard flash column. Figure 2 shows purification on the RediSep Rf Gold columns with dramatically less time and solvent. Because of the spherical packing of the RediSep Rf Gold column, the backpressure was only 65 psi even at the high flow rates of 80 mL/minute. The backpressure of smaller particle size, irregular particle columns exceeded the pressure capabilities of the columns and system.

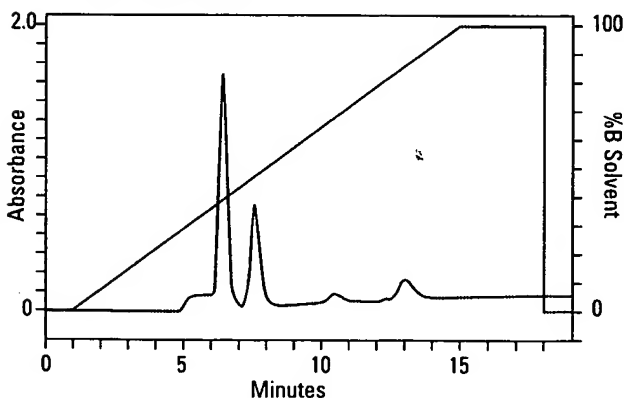
Entire purification time from start to finish is 29 minutes for the standard method, including the column equilibration and post-run air purge. This is reduced to only 10 minutes by using Gold Speed method optimized for the RediSep Rf Gold high performance columns. Actual run time was 18 minutes versus 5 minutes.

Reducing the run time saved 430 mL of solvent compared to the standard method. The CombiFlash Rf system recognizes the RediSep Rf Gold high performance column through RFID technology, and loads the Gold Speed parameters. At a click of a button labs can save 30–50% on their solvent usage and greatly reduce purification time. Greater savings are seen with larger columns.

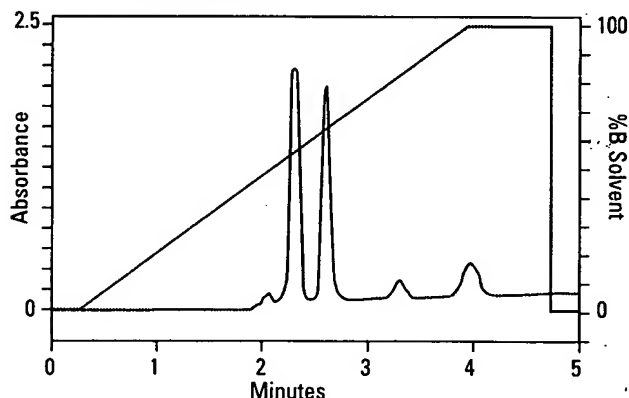
**Table 2: Run conditions for Figure 2**

Column size:	40 g
Load:	0.4 g (1% load)
Solvents:	Hexane and acetone
Gradient:	0 to 100% acetone
Detection wavelength:	229 nm
Flow rate:	40 mL/min : 80 mL/min
Run time:	18 minutes for the standard flash column; 5 minutes for the RediSep Rf Gold high performance column

Standard Flash Column  
18 minutes  
1.1 L total solvent used



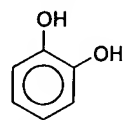
RediSep Rf Gold Column  
5 minutes  
670 mL total solvent used



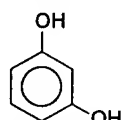
**Figure 2: Gold Speed Purification of 3-(2-nitrophenyl amino) propionitrile** on a 40 gram standard flash column (left) and a RediSep Rf Gold high performance column (right) with Gold Speed parameters

## Comparison to Irregular High Performance Silica

Spherical silica shows higher resolution when compared to similar size irregular silica when run with the Gold Speed methods. Figure 3 shows a purification of catechol and resorcinol using a column packed with irregular high performance silica gel (20–40  $\mu\text{m}$ ) compared to a RediSep Rf Gold high performance column.



catechol



resorcinol

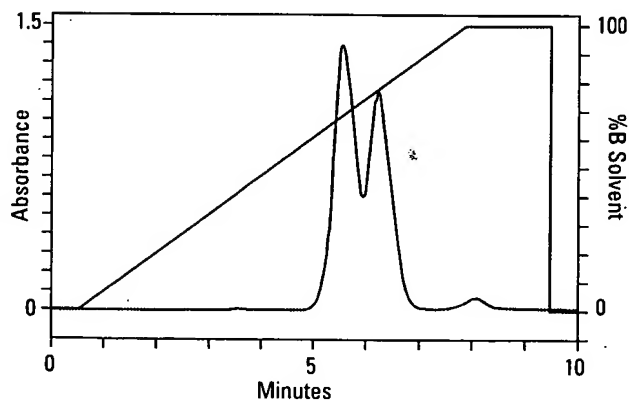
**Table 3: Run conditions for Figure 3**

Column size:	400 g
Load:	0.40 (1.0% load)
Solvents:	Hexane and ethyl acetate
Gradient:	0 to 100% ethyl acetate
Detection wavelength:	275 nm
Flow rate:	40 mL/min
Run time:	10 minutes (both columns)

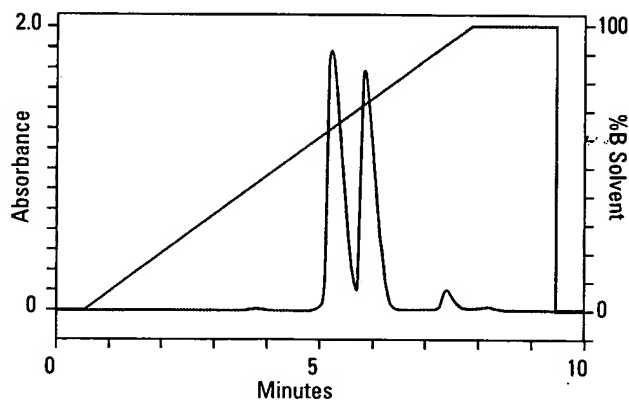
with

Under the same conditions, the RediSep Rf Gold high performance column achieved near baseline resolution of both compounds. The irregular particle, high performance column has unresolved products and runs under conditions that are in excess of recommended pressure capabilities of the column and system.

Irregular High Performance Column



RediSep Rf Gold Column



**Figure 3: Gold Speed** Comparison of irregular, high performance column (20–40  $\mu\text{m}$ , left) to RediSep Rf Gold high performance column (right) purifying catechol and resorcinol.

## Conclusion

The RediSep Rf Gold high performance columns provide superior resolution compared to standard silica flash columns and irregular particle high performance flash columns. This enhanced resolution can be used to purify closely eluting compounds using the Gold Resolution methods on the CombiFlash Rf or reduce the total run time with the Gold Speed methods. The CombiFlash Rf system allows easy setup and choice between the performance options via the RFID tags.

Reducing the total run time shows 30–50% savings in time and solvent usage. Indirect savings from the use of RediSep Rf Gold columns include reduced solvent waste and time savings due to the reduced number of fractions that need to be processed. Since the peaks are sharper, fractions are collected in fewer test tubes. This reduced the time to evaporate the solvent from these fractions by almost two-thirds.

## RediSep Rf Gold Ordering Information:

Part Number	Description
69-2203-344	RediSep Rf Gold RediSep Rf Gold Column, 4 g, pkg of 14
69-2203-345	RediSep Rf Gold RediSep Rf Gold Column, 12 g, pkg of 14
69-2203-346	RediSep Rf Gold RediSep Rf Gold Column, 24 g, pkg of 10
69-2203-347	RediSep Rf Gold RediSep Rf Gold Column, 40 g, pkg of 10
69-2203-348	RediSep Rf Gold RediSep Rf Gold Column, 80 g, pkg of 6
69-2203-349	RediSep Rf Gold RediSep Rf Gold Column, 120 g, pkg of 6
69-2203-359	RediSep Rf Gold RediSep Rf Gold Column, 220 g, pkg of 4
69-2203-369	RediSep Rf Gold RediSep Rf Gold Column, 330 g, pkg of 3
69-2203-427	RediSep Rf Gold RediSep Rf Gold Column, 750 g, pkg of 3
69-2203-428	RediSep Rf Gold RediSep Rf Gold Column, 1500 g, pkg of 2

*RediSep Rf Gold is a trademark of Teledyne Isco Inc. CombiFlash, and RediSep are registered trademarks of Teledyne Isco, Inc. All other trademarks are the property of their respective holders.*

*Last modified March 20, 2009*

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Toll-free: (800) 228-4373 • Phone: (402) 464-0231 • Fax: (402) 465-3091

E-mail: [isconinfo@teledyne.com](mailto:isconinfo@teledyne.com)

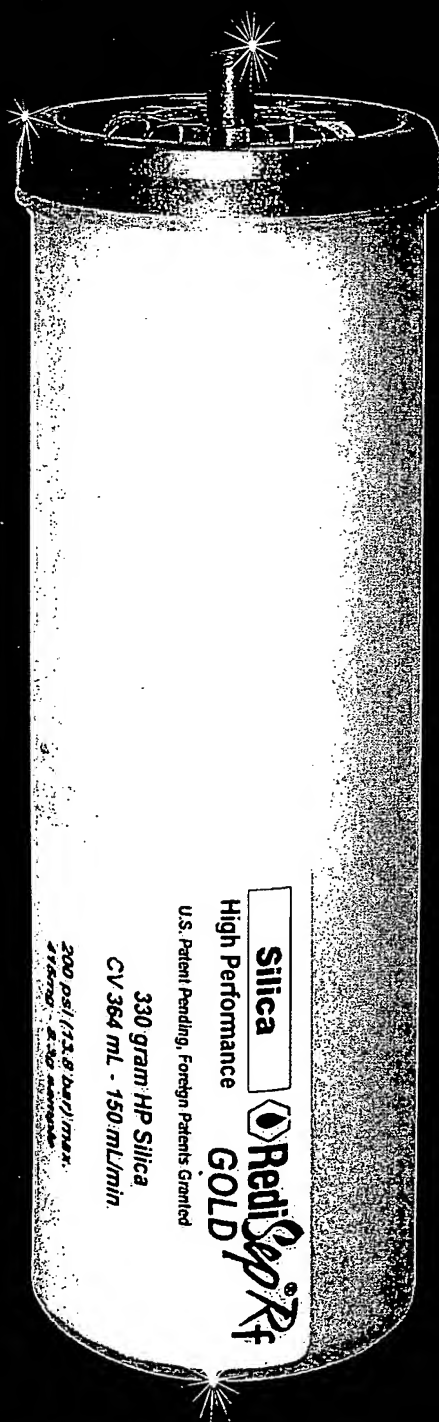


**TELEDYNE ISCO**

A Teledyne Technologies Company

# RediSep Rf Gold™

— Resolution With Speed



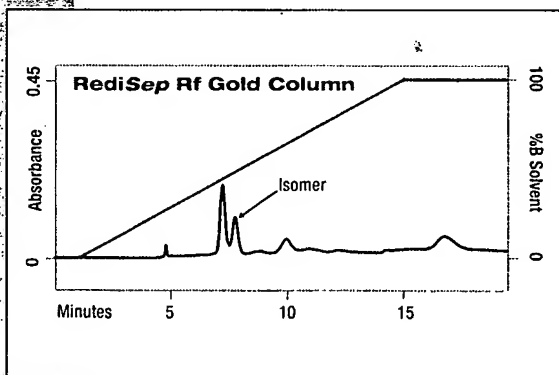
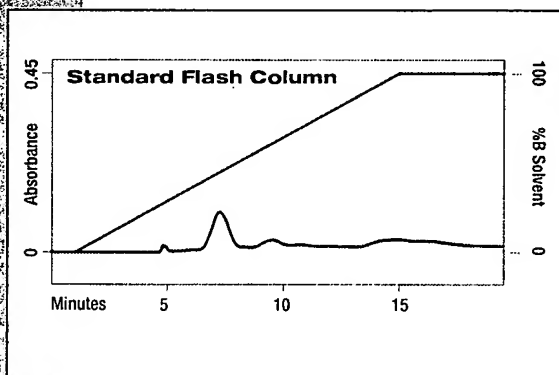


# RediSep Rf Gold™ — High

## Resolution With Speed

RediSep Rf Gold™ high performance flash columns deliver superior sample purity through the use of fine spherical silica gel (20 - 40  $\mu$ m). RediSep® columns were the first flash columns with Luer end fittings to

provide quick and easy connection to all CombiFlash® systems and most other flash setups. As a pioneer in flash chromatography Teledyne Isco continues to bring you the latest innovations to improve your productivity.



### Run Conditions

Column size:	40 g
Load:	333 mg (on 5 gram)
Solvents:	Hexane & Ethyl Acetate
Flow rate:	40 mL/min
Run time:	19.4 min.

See Application Note #70 at  
[www.isco.com/products/appnotes.asp](http://www.isco.com/products/appnotes.asp)  
for complete information.

## Gold Resolution

$$\Delta Rf \leq 0.1$$

## Maximum Resolution Without Backpressure

See better purifications on any flash system using your standard methods.

- ◆ Provides twice the resolving power of typical disposable flash chromatography columns
- ◆ Separate difficult compounds with low  $\Delta Rf$ , such as isomers or trace compounds, with spherical silica gel
- ◆ Avoid high back pressure which causes longer run times as seen with other high performance flash columns
- ◆ Purify your tough compounds on a single column

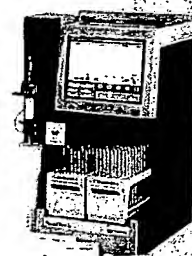
Contact us today  
to see the high  
performance  
for yourself!



# Performance Flash Silica Columns

## The RFID Advantage

Simply select between Gold Resolution and Gold Speed methods on CombiFlash Rf systems, with RFID.

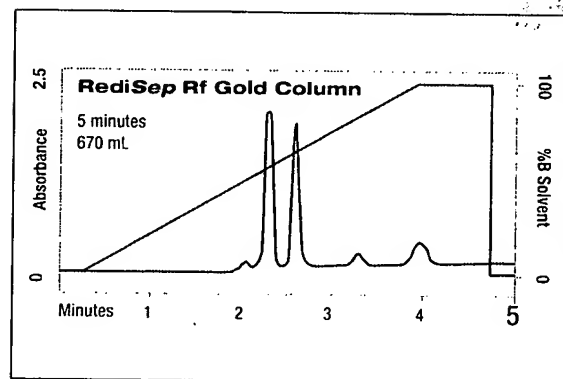
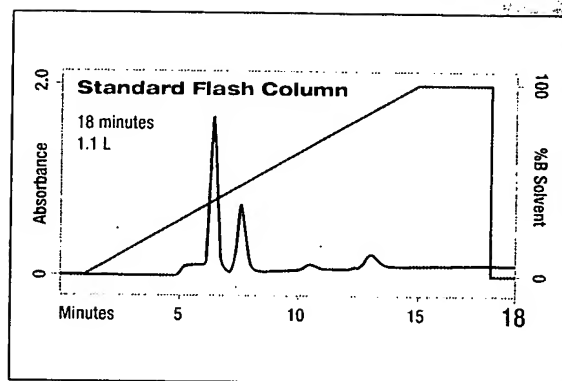


**Gold Speed**  
 $\Delta Rf > 0.1$

## Save Time & Solvent

Take advantage of the sharper peaks provided by spherical media to shorten purification time. Convert your methods to Gold Speed with steeper gradients and higher flow rates.

- ◆ Save on average 60% of your purification time with Gold Speed
- ◆ Save 30% or greater on solvents
- ◆ Separate silica sensitive compounds faster
- ◆ Dry compounds faster by collecting in 2/3 fewer fractions



**(800)228-4373**

### Run Conditions

Column size:	40 g
Load:	0.4 g (1% load)
Solvents:	Hexane and Acetone
Flow rate:	40 mL/min: 80 mL/min

See Application Note #72 at  
[www.isco.com/products/appnotes.asp](http://www.isco.com/products/appnotes.asp)  
for complete information.

## Ordering Information

### RediSep Rf Gold™ Silica Columns

4 gram, package of 14 .....	69-2203-344
12 gram, package of 14 .....	69-2203-345
24 gram, package of 10 .....	69-2203-346
40 gram, package of 10 .....	69-2203-347
80 gram, package of 6 .....	69-2203-348
120 gram, package of 6 .....	69-2203-349
220 gram, package of 4 .....	69-2203-359
330 gram, package of 3 .....	69-2203-369

These RediSep Rf Gold™ columns are packed with 20-40 µm, spherical particles.

U.S. patents pending. European patent #1,316,798 granted.

Teledyne Isco, Inc. reserves the right to change specifications without notice.

To learn more about RediSep Rf Gold® columns, visit our  
Liquid Chromatography Application Note Library at  
[www.isco.com/products/appnotes.asp](http://www.isco.com/products/appnotes.asp).



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